



SEQUENCE LISTING

<110> Dalemans, Wilfried L.J.
Gerard, Catherine Marie Ghislaine

<120> Compositions Comprising Human Papilloma Virus Proteins
and Fusion Proteins Adjuvanted with a CpG Oligonucleotide

<130> B45124

<140> 09/581,976
<141> 2000-06-20

<150> PCT/EP98/08563
<151> 1998-12-18

<150> GB 9727262.9
<151> 1997-12-24

<160> 28

<170> FastSEQ for Windows Version 3.0

<210> 1
<211> 220
<212> PRT
<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenzae B and E7 from Human papilloma virus type
16)

<400> 1

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85 90 95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100 105 110
Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu
115 120 125
Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser
130 135 140
Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro
145 150 155 160
Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser
165 170 175
Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu
180 185 190
Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser

195	200	205
Gln Lys Pro Thr Ser Gly His His His His His His His		
210	215	220
<210> 2		
<211> 663		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Chimaeric protein (protein D from Haemophilus		
influenzae B and E7 from Human papilloma virus type		
16)		
<400> 2		
atggatcaa gcagccattc atcaaatatg gcbaataccc aaatgaaatc agacaaaatc	60	
attattgtct accgtgggtgc tagcggttat ttaccagagc atacgttaga atctaaagca	120	
cttgcgtttg cacaacaggc tgattatata gagcaagatt tagcaatgac taaggatggt	180	
cgttttagtgg ttattcacga tcactttta gatggcttgc ctgatgtgc gaaaaaaattc	240	
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaaatt	300	
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca	360	
ttgcatgaat atatgttaga tttgcaacca gagacaactg atctctactg ttatgagcaa	420	
ttaaatgaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg	480	
gacagagccc attacaatat tgtaacctt tgttcaagt gtgactctac gcttcgggtg	540	
tgcgtacaaa gcacacacgt agacattcg actttggaa acctgttaat gggcacacta	600	
ggaattgtgt gccccatctg ttctcagaaa ccaactagtg gccaccatca ccatcaccat	660	
taa	663	
<210> 3		
<211> 822		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Chimaeric protein (protein D from Haemophilus		
influenzae B and E6 from Human papilloma virus type		
16)		
<400> 3		
atggatcaa gcagccattc atcaaatatg gcbaataccc aaatgaaatc agacaaaatc	60	
attattgtct accgtgggtgc tagcggttat ttaccagagc atacgttaga atctaaagca	120	
cttgcgtttg cacaacaggc tgattatata gagcaagatt tagcaatgac taaggatggt	180	
cgttttagtgg ttattcacga tcactttta gatggcttgc ctgatgtgc gaaaaaaattc	240	
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaaatt	300	
caaagtttag aaatgacaga aaactttgaa accatggcca tggttcagga cccacaggag	360	
cgacccagaa agtaccaca gttatgcaca gagctgcaaa caactataca tgatataata	420	
ttagaatgtg tgtactgca gcaacagttt ctgcgacgtg aggttatata ctttgcttt	480	
cgggatttat gcatgtata tagagatggg aatccatata ctgtatgtga taaaatgttta	540	
aagttttattt ctaaaatttag tgagtataga cattattgtt atagttgtta tggacaaca	600	
ttagaacagc aataacaacaa accgttgtgt gatttgtta ttagtgtat taactgtcaa	660	
aagccactgt gtcctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat	720	
ataaggggtc ggtggaccgg tcgatgtatg tcttgttgc gatcatcaag aacacgtaga	780	
gaaacccagc tgactagtgg ccaccatcac catcaccatt aa	822	
<210> 4		
<211> 273		
<212> PRT		
<213> Artificial Sequence		

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E6 from Human papilloma virus type
 16)

 <400> 4
 Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1 5 10 15
 Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20 25 30
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35 40 45
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50 55 60
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 115 120 125
 Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 130 135 140
 Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 145 150 155 160
 Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
 165 170 175
 Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
 180 185 190
 Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
 195 200 205
 Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
 210 215 220
 Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
 225 230 235 240
 Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
 245 250 255
 Arg Thr Arg Arg Glu Thr Gln Leu Thr Ser Gly His His His His His
 260 265 270
 His

<210> 5
 <211> 1116
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E6E7 fusion from Human papilloma
 virus type 16)

<400> 5
 atggatccaa gcagccattc atcaaatatg gcbaataccc aaatgaaatc agacaaaatc 60
 attattgcctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120
 cttgcgttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatgg 180
 cgtttagtgg ttattcacga tcactttta gatggcttga ctgatgtgc gaaaaaaattc 240
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
 caaagtttag aaatgacaga aaactttgaa accatggcca tgttcagga cccacaggag 360

cgaccaggaa	agttaccaca	gttatgcaca	gagctgcaaa	caactataca	tgatataata	420
ttagaatgtg	tgtactgcaa	gcaacagtta	ctgacgtg	aggtatatga	cttgcttt	480
cgggatttat	gcatagtata	tagagatggg	aatccatatg	ctgtatgtga	taaatgttta	540
aagtttatt	ctaaaattag	tgagtataga	cattattgtt	atagttgtt	tggacaaca	600
ttagaacagc	aataacaaca	accgttgtgt	gatttgttaa	ttaggtgtat	taactgtcaa	660
aagccactgt	gtcctgaaga	aaagcaaaga	catctggaca	aaaagcaaag	atccataat	720
ataaggggtc	ggtggaccgg	tcgatgtatg	tctgttgca	gatcatcaag	aacacgtaga	780
gaaacccagc	tgatgcattgg	agatacacct	acattgcattg	aatatatgtt	agatttgc当地	840
ccagagacaa	ctgatctcta	ctgttatgag	caattaaatg	acagctcaga	ggaggaggat	900
gaaatagatg	gtccagctgg	acaagcagaa	ccggacagag	cccattacaa	tattgttaacc	960
ttttgttgc当地	agtgtgactc	tacgcttcgg	ttgtgcgtac	aaagcacaca	cgtagacatt	1020
cgtactttgg	aagacctgtt	aatgggcaca	ctaggaattt	tgtgccccat	ctgttctc当地	1080
aaaccaacta	gtggccacca	tcaccatcac	cattaa			1116

<210> 6

<211> 371

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenzae B and E6E7 fusion from Human papilloma virus type 16)

<400> 6

Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys	
1									5			10			15	
Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro	
								20			25			30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp	
								35			40			45		
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val	
								50			55			60		
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe	
								65			70			75		80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr	
								85			90			95		
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met	
								100			105			110		
Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu	Pro	Gln	Leu	
								115			120			125		
Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu	Glu	Cys	Val	
								130			135			140		
Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp	Phe	Ala	Phe	
								145			150			155		160
Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr	Ala	Val	Cys	
								165			170			175		
Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr	Arg	His	Tyr	
								180			185			190		
Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr	Asn	Lys	Pro	
								195			200			205		
Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys	Pro	Leu	Cys	
								210			215			220		
Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg	Phe	His	Asn	
								225			230			235		240
Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys	Arg	Ser	Ser	
								245			250			255		
Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	
								260			265			270		
His	Glu	Tyr	Met	Leu	Asp	Leu	Gln	Pro	Glu	Thr	Asp	Leu	Tyr	Cys		

275	280	285
Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly		
290	295	300
Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr		
305	310	315
Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr		
325	330	335
His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly		
340	345	350
Ile Val Cys Pro Ile Cys Ser Gln Lys Pro Thr Ser Gly His His His		
355	360	365
His His His		
370		
<210> 7		
<211> 663		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Chimaeric protein (protein D from Haemophilus influenzae B and mutated E7 from Human papilloma virus type 16)		
<400> 7		
atggatccaa gcagccattc atcaaatatg ggcataaccc aaatgaaatc agacaaaatc		60
attattgtct accgtgggtc tagcggttat ttaccagagc atacgttaga atctaaagca		120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatgg		180
cgttagtgg ttatttcacga tcactttta gatggcttga ctgatgttc gaaaaaattc		240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt		300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca		360
ttgcatgaat atatgttaga tttgcaacca gagacaactg atctctacgg ttatcagcaa		420
ttaaatgaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg		480
gacagagccc attacaatat tgtaacctt tgttcaagt gtgactctac gcttcgggt		540
tgcgtacaaa gcacacacgt agacattcgt acttttgaag acctgttaat gggcacacta		600
ggaattgtgt gccccatctg ttctcagaaa ccaacttagtg gccaccatca ccatcaccat		660
taa		663
<210> 8		
<211> 220		
<212> PRT		
<213> Artificial Sequence		
<220>		
<223> Chimaeric protein (protein D from Haemophilus influenzae B and mutated E7 from Human papilloma virus type 16)		
<400> 8		
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys		
1	5	10
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro		
20	25	30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp		
35	40	45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val		
50	55	60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe		
65	70	75
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr		80

85	90	95	
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met			
100	105	110	
Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu			
115	120	125	
Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gln Gln Leu Asn Asp Ser			
130	135	140	
Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro			
145	150	155	160
Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser			
165	170	175	
Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu			
180	185	190	
Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser			
195	200	205	
Gln Lys Pro Thr Ser Gly His His His His His His			
210	215	220	

<210> 9

<211> 879

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

<400> 9

atgaaagggg gaattgtaca ttcagacggc tcttatccaa aagacaagtt tgagaaaatc	60
aatggcactt ggtactactt tgacagttca ggcttatatgc ttgcagaccg ctggaggaag	120
cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaaag	180
aaaatcgctg ataagtggta ctatccaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acacttggtt ctacttagac gctaaagaag ggcgcattgg atcaaatgcc	300
tttatccagt cagcggacgg aacaggctgg tactaccta aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga	420
cccagaaagt taccacagtt atgcacagag ctgcaaacaa ctatacatga tataatatta	480
gaatgtgtt actgcaagca acagttactg cgacgtgagg tatatgactt tgctttcgg	540
gatttatgca tagtatata agatggaaat ccatatgctg tatgtataat atgtttaaag	600
ttttattcta aaattagtga gtatagacat tattgtata gtttgtatgg aacaacattha	660
gaacagcaat acaacaaacc gttgtgtat ttgttaatta ggtgtattaa ctgtcaaaag	720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata	780
aggggtcggt ggaccggcgtc atgtatgtct ttgtgcagat catcaagaac acgttagagaa	840
acccagctga cttagggcca ccatcaccat caccattaa	879

<210> 10

<211> 292

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

<400> 10

Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys			
1	5	10	15
Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr			
20	25	30	

Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
 35 40 45
 Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
 50 55 60
 Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
 65 70 75 80
 Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
 85 90 95
 Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100 105 110
 Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115 120 125
 Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu
 130 135 140
 Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu
 145 150 155 160
 Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp
 165 170 175
 Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr
 180 185 190
 Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr
 195 200 205
 Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr
 210 215 220
 Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys
 225 230 235 240
 Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg
 245 250 255
 Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys
 260 265 270
 Arg Ser Ser Arg Thr Arg Arg Glu Thr Gln Leu Thr Ser Gly His His
 275 280 285
 His His His His
 290

<210> 11
 <211> 720
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E7 from Human papilloma virus type
 16)

<400> 11
 atgaaagggg gaattgtaca ttcagacggc tcttatccaa aagacaagtt tgagaaaatc
 60
 aatggcactt ggtactactt tgacagttca ggctatatgc ttgcagaccg ctggaggaag
 120
 cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaaag
 180
 aaaatcgctg ataagtggta ctattcaac gaagaagggtg ccatgaagac aggctgggtc
 240
 aagtacaagg acacttggta ctacttagac gctaaagaag gcgcatggat atcaaatgcc
 300
 tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca
 360
 gacaggccag aattggccag catgctggac atggccatgc atggagatac acctacattg
 420
 catgaatata tggtagatt gcaaccagag acaactgtac tctactgtta tgagcaatta
 480
 aatgacagct cagaggagga ggttggaaata gatggtccag ctggacaagc agaaccggac
 540
 agagccatt acaatattgt aaccttttgt tgcaagtgtg actctacgct tcggttgtgc
 600
 gtacaaagca cacacgtaga cattcgtact ttgaaagacc tgtaatggg cacactagga
 660
 attgtgtgcc ccatctgttc tcagaaacca actagtggcc accatcacca tcaccattaa
 720

<210> 12

```

<211> 239
<212> PRT
<213> Artificial Sequence

<220>
<223> Chimaeric protein (Clyta from Streptococcus
      pneumoniae and E7 from Human papilloma virus type
      16)

<400> 12
Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys
  1           5          10          15
Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
  20          25          30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
  35          40          45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
  50          55          60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
  65          70          75          80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
  85          90          95
Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100         105         110
Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115         120         125
Leu Asp Met Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met
 130         135         140
Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu
 145         150         155         160
Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln
 165         170         175
Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys
 180         185         190
Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile
 195         200         205
Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro
 210         215         220
Ile Cys Ser Gln Lys Pro Thr Ser Gly His His His His His His His
 225         230         235

```

```
<210> 13
<211> 1173
<212> DNA
<213> Artificial Sequence
```

<220>
<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 13

atgaaagggg	gaattgtaca	ttcagacggc	tcttatccaa	aagacaagtt	tgagaaaaatc	60
aatggcactt	ggtactactt	tgacagttca	ggctatatgc	ttgcagaccg	ctggaggagaag	120
cacacagacg	gcaactggta	ctgggtcgac	aactcaggcg	aaatggctac	aggcttggaaag	180
aaaatcgctg	ataagtggta	ctatttcaac	gaagaagggt	ccatgaagac	aggctgggtc	240
aagtacaagg	acacttggta	ctacttagac	gctaaagaag	gcgccatggt	atcaaatgcc	300
tttatccagt	cagcggacgg	aacaggctgg	tactaccta	aaccagacgg	aacactggca	360
gacaggccag	aattggccag	catgctggac	atggccatgt	ttcaggacc	acaggagcga	420
cccagaaaat	taccacagtt	atgcacagag	ctgcaaaca	ctatacatga	tataatatta	480

gaatgtgtgt	actgcaagca	acagttaactg	cgacgtgagg	tatatgactt	tgcttttcgg	540
gatttatgca	tagtatata	agatggaaat	ccatatgctg	tatgtgataa	atgtttaaag	600
tttattcta	aaatttagtga	gtatagacat	tattgtata	gtttgtatgg	aacaacatta	660
gaacagcaat	acaacaaacc	gttgtgtat	ttgttaatta	ggtgtattaa	ctgtcaaaag	720
ccactgtgtc	ctgaagaaaa	gcaaagacat	ctggacaaaa	agcaaagatt	ccataatata	780
aggggtcgg	ggaccggtcg	atgtatgtct	tgttgcagat	catcaagaac	acgttagagaa	840
acccagctga	tgcattggaga	tacacccata	ttgcattgaat	atatgttga	tttgcaccca	900
gagacaactg	atctctactg	ttatgagcaa	ttaaatgaca	gctcagagga	ggaggatgaa	960
atagatggtc	cagctggaca	agcagaaccg	gacagagccc	attacaatat	tgtaacctt	1020
tgttgcagt	gtgactctac	gcttcggtt	tgcgtacaaa	gcacacacgt	agacattcgt	1080
actttggaaag	acctgttaat	gggcacacta	ggaattgtgt	gccccatctg	ttctcagaaa	1140
ccaaactagt	gccaccatca	ccatcacca	taa			1173

<210> 14

<211> 390

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 14

Met	Lys	Gly	Gly	Ile	Val	His	Ser	Asp	Gly	Ser	Tyr	Pro	Lys	Asp	Lys
1				5					10				15		
Phe	Glu	Lys	Ile	Asn	Gly	Thr	Trp	Tyr	Tyr	Phe	Asp	Ser	Ser	Gly	Tyr
						20			25				30		
Met	Leu	Ala	Asp	Arg	Trp	Arg	Lys	His	Thr	Asp	Gly	Asn	Trp	Tyr	Trp
						35			40			45			
Phe	Asp	Asn	Ser	Gly	Glu	Met	Ala	Thr	Gly	Trp	Lys	Lys	Ile	Ala	Asp
						50			55		60				
Lys	Trp	Tyr	Tyr	Phe	Asn	Glu	Glu	Gly	Ala	Met	Lys	Thr	Gly	Trp	Val
						65			70		75		80		
Lys	Tyr	Lys	Asp	Thr	Trp	Tyr	Tyr	Leu	Asp	Ala	Lys	Glu	Gly	Ala	Met
						85			90		95				
Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr
						100			105		110				
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met
						115			120		125				
Leu	Asp	Met	Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu
						130			135		140				
Pro	Gln	Leu	Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu
						145			150		155		160		
Glu	Cys	Val	Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp
						165			170		175				
Phe	Ala	Phe	Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr
						180			185		190				
Ala	Val	Cys	Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr
						195			200		205				
Arg	His	Tyr	Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Leu	Glu	Gln	Gln	Tyr	
						210			215		220				
Asn	Lys	Pro	Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys
						225			230		235		240		
Pro	Leu	Cys	Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg
						245			250		255				
Phe	His	Asn	Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys
						260			265		270				
Arg	Ser	Ser	Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Met	His	Gly	Asp	Thr
						275			280		285				

Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp
 290 295 300
 Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu
 305 310 315 320
 Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn
 325 330 335
 Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val
 340 345 350
 Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly
 355 360 365
 Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln Lys Pro Thr Ser Gly
 370 375 380
 His His His His His
 385 390

<210> 15
 <211> 684
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E7 from Human papilloma virus type
 18)

<400> 15
 atggatccaa gcagccattc atcaaatatg gcgaaataccc aaatgaaaatc agacaaaaatc 60
 attattgctc accgtgggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatgg 180
 cgtttagtgg ttattcacga tcactttta gatggcttga ctgatgttgc gaaaaaaaaatc 240
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaaattc 300
 caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca 360
 ttgcaagaca ttgttattgca ttttagagccc caaaaatgaaa ttccggttga ccttctatgt 420
 cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa 480
 catttaccag cccgacgagc cgaaccacaa cgtcacacaa tggatgttat gtgttgtaag 540
 tgtgaagcca gaatttgagct agtagtagaa agctcagcag acgacacctcg agcattccag 600
 cagctgtttc tgaacaccct gtcctttgtg tggatgttgc gtgcattccca gcagactagt 660
 ggccaccatc accatcacca ttaa 684

<210> 16
 <211> 227
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E7 from Human papilloma virus type
 18)

<400> 16
 Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1 5 10 15
 Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20 25 30
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35 40 45
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50 55 60
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80

Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu
 115 120 125
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu
 130 135 140
 Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Glu Val Asn His Gln
 145 150 155 160
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys
 165 170 175
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser
 180 185 190
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser
 195 200 205
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His
 210 215 220
 His His His
 225

<210> 17
 <211> 109
 <212> PRT
 <213> Escherichia coli

<400> 17
 Met Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
 1 5 10 15
 Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
 20 25 30
 Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp
 35 40 45
 Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
 50 55 60
 Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
 65 70 75 80
 Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
 85 90 95
 Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala
 100 105

<210> 18
 <211> 684
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and mutated E7 from Human papilloma
 virus type 18)

<400> 18
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaaatc agacaaaatc 60
 attattgtct accgtgggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120
 cttgcgttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
 cgtttagtgg ttattcacga tcactttta gatggcttga ctgatgttgc gaaaaaattc 240
 ccacatgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
 caaagttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca 360
 ttgcaagaca ttgttattgca tttagagccc caaatgaaa ttccgggtga ctttcgttgtt 420

caccagcaat	taagcgactc	agaggaagaa	aacgatgaaa	tagatggagt	taatcatcaa	480
catttaccag	cccgacgagc	cgaaccacaa	cgtcacacaa	tgttgttat	gtgtttaag	540
tgtgaagcca	gaattgagct	agtagtagaa	agctcagcag	acgacccctcg	gcattccag	600
cagctgttc	tgaacacccct	gtccttgtg	tgtccgttgt	gtgcataccc	gcagactagt	660
ggccaccatc	accatcacca	ttaa				684

<210> 19
 <211> 227
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus influenzae B and mutated E7 from Human papilloma virus type 18)

<400> 19
 Met Asp Pro Ser Ser His Ser Asn Met Ala Asn Thr Gln Met Lys
 1 5 10 15
 Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20 25 30
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35 40 45
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50 55 60
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu
 115 120 125
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Gly His Gln Gln Leu
 130 135 140
 Ser Asp Ser Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln
 145 150 155 160
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys
 165 170 175
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser
 180 185 190
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser
 195 200 205
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His
 210 215 220
 His His His
 225

<210> 20
 <211> 837
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus influenzae virus B and E6 from Human papilloma virus type 18)

<400> 20
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc

attattgctc accgtggtgc tagcggttat ttaccagagc atacgtaga atctaaagca	120
cttcgcgttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatgg	180
cgttagtgg ttattcacga tcactttta gatggcttgc ctgatgtgc gaaaaaattc	240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaaatt	300
caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg	360
cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcaactgca agacatagaa	420
ataacctgtg tatattgcaa gacagtatttga gaaacttacag aggtatttga atttgcattt	480
aaagattttat ttgtgggtgtat tagagacagt ataccgcattt ctgcatttgcataaaatgtata	540
gatttttattt cttagaatttag agaattaaga cattatttgcatttgcataaaatgtata tggagacaca	600
ttggaaaaaac taactaacac tgggttatac aattttattaa taagggtgcct gcgggtgcacag	660
aaaccgttga atccagcaga aaaacttaga caccttaatg aaaaacgcacg atttcacaac	720
atagctgggc actatagagg ccagtgcacat tcgtgctgca accgagcacg acaggaacga	780
ctccaacgcac gcagagaaac acaagtaact agtggccacc atcaccatca ccattaa	837

<210> 21

<211> 278

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenzae B and E6 from Human papilloma virus type 18)

<400> 21

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys	
1 5 10 15	
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro	
20 25 30	
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp	
35 40 45	
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val	
50 55 60	
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe	
65 70 75 80	
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr	
85 90 95	
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met	
100 105 110	
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu	
115 120 125	
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val	
130 135 140	
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe	
145 150 155 160	
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys	
165 170 175	
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr	
180 185 190	
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly	
195 200 205	
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn	
210 215 220	
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn	
225 230 235 240	
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala	
245 250 255	
Arg Gln Glu Arg Leu Gln Arg Arg Glu Thr Gln Val Thr Ser Gly	
260 265 270	
His His His His His	

```

<210> 22
<211> 1152
<212> DNA
<213> Artificial Sequence

<220>
<223> Chimaeric protein (protein D from Haemophilus
      influenzae B and E6E7 fusion from Human papilloma
      virus type 18)

<400> 22
atggatccaa gcgccattc atcaaatatg gccaataccc aaatgaaatc agacaaaatc      60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgtaga atctaaagca    120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatgg    180
cgtttagtgg ttattcacga tcactttta gatggcttga ctgatgtgc gaaaaaaattc    240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacett aaaagaaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg 360
cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa 420
ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcattt 480
aaagattttat ttgtggtgta tagagacagt ataccgcattt ctgcatttgcataaaatgtata 540
gatttttattt ctagaatttag agaattaaga cattatttgcatttgcatttgcataaaatgtata 600
ttggaaaaaac taactaacac tgggttatac aattttttaa taagggtgcct gcgggtgcac 660
aaaccgttga atccagcaga aaaacttgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 720
atagctgggc actatacgagg ccagtgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 780
ctccaacgcac gcagagaaac acaagtaatgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 840
gtattgcatt tagagccccca aaatgaaatttgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 900
agcgacttcag aggaagaaaaa cgatgaaataaacttgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 960
cgacgagccg aaccacaacgc ttcacacaatgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 1020
atttgagcttag tagtagaaag ctcagcagac gacccttcgag cattccagca gctgtttctg 1080
aacaccctgt cctttgtgttgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 1140
catcaccatttgcatttgcataaaatgtataaacttgcatttgcataaaatgtataaacttgcatttgcataaaatgtata 1152

<210> 23
<211> 383
<212> PRT
<213> Artificial Sequence

<220>
<223> Chimaeric protein (protein D from Haemophilus
      influenzae B and E6E7 fusion from Human papilloma
      virus type 18)

<400> 23
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
      1           5           10          15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
      20          25          30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
      35          40          45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
      50          55          60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
      65          70          75          80
Pro His Arg His Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
      85          90          95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
      100         105         110
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu

```

115	120	125
Cys Thr Glu Leu Asn Thr Ser	Leu Gln Asp Ile Glu Ile	Thr Cys Val
130	135	140
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe		
145	150	155
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys		
165	170	175
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr		
180	185	190
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly		
195	200	205
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn		
210	215	220
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn		
225	230	235
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala		
245	250	255
Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Met His Gly		
260	265	270
Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu Pro Gln Asn		
275	280	285
Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser Asp Ser Glu		
290	295	300
Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His Leu Pro Ala		
305	310	315
Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met Cys Cys Lys		
325	330	335
Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser Ala Asp Asp Leu		
340	345	350
Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe Val Cys Pro		
355	360	365
Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His His His His		
370	375	380

<210> 24
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 24

tccatgacgt tcctgacgtt

20

<210> 25
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 25

tctcccagcg tgccat

18

<210> 26
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
<223> Synthetic

<400> 26
accgatgacg tcgcccgtga cggcaccacg

30

<210> 27
<211> 6
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 27

rrcggyy

6

<210> 28
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> E.coli

<400> 28

Thr Ser Gly His His His His His His
1 5